

Edible fresh water molluscs diversity in the different water bodies of Gangarampur Block, Dakshin Dinajpur, West Bengal

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ABSTRACT

Objectives of the study were to investigate the abundance and diversity indices of fresh water molluscs in the River Punarhaba and different canals, ponds, paddy fields and ditches. This will be the first line of abstract instead of exist first line. To investigate the edible fresh water molluscs abundance and diversity indices at the River Punarhaba and different canals, ponds, paddy fields and ditches. A survey was conducted at five sampling sites of Gangarampur block with hand picking and quadrat method. Data were also collected from local market. Fresh water molluscs were identified with standard references and then preserved in alcohol. A total of five edible fresh water molluscs were reported from Gangarampur Block. Snails were abundant in monsoon season. Most abundant species was *Bellamya bengalensis* (Lamarck, 1882). Paddy fields, canals, ponds and ditches were rich in fresh water edible molluscs in comparison to the river Punarhaba. Maximum Shannon diversity index was recorded at site 1. Abundance of snails drastically decreased in winter season at all sites. *Pilaglobusa* and *Bellamya bengalensis* have high demand among the people. Overexploitation from the wild may leads to reduction in number of fresh water snails. Farming of edible snails may be the alternate pathway of mitigating the demand.

Key words : Edible molluscs, Abundance, Gangarampur block and overexploitation.

Introduction

Molluscs are the second largest diverse group of invertebrate next to insects (Rao Subba, 1989 and Bouchet, 1991). Boss (1973) recorded 80,00 to 135,000 molluscan species. Five thousand freshwater species of molluscs were reported by Seddon, (2000). Chanda (2017) reported nine species of fresh water snails from Midnapur district, West Bengal. Many fresh water snails in West Bengal are used as supplementary food resources of tribal communities. Freshwater molluscs are used as supplementary protein sources in many countries like India (Rao Subba and Dey, 1989), Mexico (Garcia-Cubas,

1963), Tiwan, Formosa Thailand, and the Philippines (Baby *et al.* 2010). Molluscan crushed shells are also used as supplementary food in fishery and duckery farm. In developing country like India wild freshwater molluscs are consumed as a rich source of protein by poor communities. Indian tribal communities mostly depend on fresh water snails for protein. Snails are generally preferred as a food in the states of West Bengal and the entire north eastern region (Hornell, 1917; Ramakrishna and Dey, 2007). Snails are rich in calcium and small amounts of phosphorus, iron and zinc (Baby *et al.*, 2010; Ghosh *et al.*, 2017). In Tamil Nadu *Pila* sp. is used as food and medicinal purposes (Hornell, 1917). Rao Subba

(1889) reported that fresh water snails also used as a medicinal purpose to developing of eye sight and control diarrhoea and gastric disorders.

Gangarampur is a historical city of Dakshin Dinajpur district and total area is 315.52 km². Paddy and fishery are the main sources of income of the study area. River Punarbhaha flows through the Gangarampur and there are many ponds, canals and ditches. Gangarampur block is prone to flood. But the diversity of edible freshwater molluscs of Gangarampur block has not yet been studied. The present study on the diversity of edible fresh water molluscs on Gangarampur block, Dakshin Dinajpur is very significant.

Materials and Methods

Methodology

Edible molluscs were collected from different water bodies such as river, pond, bill, and canals by hand or fishing net and data also collected from village market. Specimens were clean and washed and then preserved in alcohol. Identification of specimen was done by standard literature such as Rao Subba (1989) and Ramakrishna and Dey (2007). Biodiversity indices like Shannon diversity index, Margalef's species richness index, dominance index and evenness index were calculated by PAST 3.0 software (Hammer *et al.*, 2001).

Quantitative Studies

The population density of snails in a given area

were studied by using following methods. A mosquito net fixed to a round iron-ring and fitted to a wooden handle. The scoop net is dragged over the aquatic vegetation or bottom of water at 1 m². The snails are collected and photograph was taken. Then molluscs were preserved in alcohol.

$$\text{Density} = n/a \text{ m}^2$$

n= number of individuals

a= area of the quadrat

Study sites : Five sampling sites of Gangarampur block were selected for the study. Details are given in Table 1.

Duration of the study : Study was carried out from January 2017 to December 2018 in different water bodies of Gangarampur Block.

Results and Discussion

All together five edible molluscs species under two orders and four families were recorded from the river, canals, paddy field, ditches etc. during the study period (Table 2). Five species are namely *Lamellidens marginalis* (Lamarck, 1822), *Lamellidens corrianus* (Lea, 1834), *Pila globosa* (Swainson, 1828) and *Bellamya bengalensis* (Lamarck, 1822) were found. Jadav *et al.* (2020) collected 12 species of edible molluscs under five families and seven genera from North East India. Chanda (2017) reported four edible molluscs species from Midnapur district, West Bengal. Most abundant species is *Bellamya bengalensis* throughout the study. Maximum numbers were recorded in monsoon season at all the

Table 1. Sampling sites along with the longitude and depth of water.

Sampling sites	Types of water body	Longitude	Average water depth in m
Site 1 (Pransagar ponds)	Large pond	25°44'7488"N, 88°610'226" E	2 to 6
Site 2 (Dhaldighi)	Huge size pond	25°40'0554"N, 88°53'9180" E	1.5 to 4
Site 3 (River Punarbhaha)	River	25°40'5456"N, 88°51'3364" E	2 to 5
Site 4 (Dophadighi paddy field)	Paddy field	25.40'3953"N, 88.59'9377" E	0.1 to 0.2
Site 5 (Ashram canal)	A small canal or ditches	25.42'0092"N, 88.60'3618" E	0.5 to 2

Table 2. Name of the species with order, family, threatened category and recorded sites.

Name of the Order	Name of the Family	Name of the species	IUCN status	Recorded sites
Architaenioglossa	Viviparidae	<i>Bellamya bengalensis</i> (Lamarck, 1882)	LC	1, 2, 3 4 and 5
	Ampullariidae	<i>Pila globosa</i> (Swainson, 1828)	LC	1, 2, 3 4 and 5
	Pachychilidae	<i>Brotia costula</i> (Rafinesque, 1833)	LC	1, 2, 3 4 and 5
Unionoida	Unionidae	<i>Lamellidens marginalis</i> (Lamarck, 1819)	LC	3 and 4
		<i>Lamellidens corrianus</i> (Lea, 1834)	LC	3 and 5

sites. Huge numbers of edible snails were recorded from paddy fields in monsoon. But the species abundance was very low during winter season because of water scarcity. *Lamellidens* spp. were recorded very rarely during the study. There were many women vendors selling fresh water snails in village market. Tribal people during monsoon season collected water snails from paddy field, canals and river and mitigated their protein deficiency. Density of snails were more in canals, ponds and

paddy field in comparison to river. Snail content moderate amount of protein such as *Bellamya bengalensis* (Lamarck, 1882) -12.10 %, *Pila globosa* (swainson, 1828)-8.05 %, *Lamellidens marginalis* (Lamarck, 1819)-9.98 % and *Lamelliden scorrianus* (Lea, 1834) -7.78 % (Chanda, 2017). Tribal people of Gangarampur block are used fresh water snails as sources of food. All the snails are under least concern category (IUCN threatened category, 2014).

Total 18530 snails were recorded during the



A woman vender selling *Pila globosa*



Pila globosa



Brotia costula



Bellamya bengalensis

Fig. 1. Different edible molluscs recorded during study.

Table 3. Number of individuals and diversity indices of edible fresh water snail at five different sampling sites.

Diversity indices	Site 1	Site 2	Site 3	Site 4	Site 5
Individuals	3949	3480	2476	4774	3851
Density/m ²	329.08	290	206.33	397.83	320.91
Dominance index	0.3305	0.3425	0.3395	0.3348	0.3221
Shannon_H	1.179	1.144	1.138	1.159	1.175
Margalef Sp. richness index	0.483	0.4905	0.5119	0.4722	0.4845
Evenness index	0.7327	0.7108	0.7073	0.72	0.7303

study from all sites and maximum individuals were recorded at site 4 and minimum in site 3. Highest density was recorded at site 4 (397.83/m²) and lowest density was reported at site 3 (206.33/m²). Maximum Shannon diversity index was recorded at site 1 and minimum at site 2. Highest and lowest dominance index were recorded at site 2 and 5 respectively. Range of Margalef's species richness index was 0.483 to 0.5119. Maximum to minimum evenness index were recorded 0.7073 to 0.7327 (Table 3).

Conclusion

A total of 5 edible molluscs were found from different water bodies of Gangarapur Block. Snails density and diversity indices were dominant in monsoon season. Over exploitation of fresh water snails and low rain fall leads to decreases in the number of snails. Besides these used of pesticide and chemical fertilizer in paddy fields are also responsible for the reduction of snails. If we will cultivate fresh water snails in natural habitat which help full in mitigating the demand without disturbing the natural population of snails.

References

- Anushree, J. and Das, N.K. 2020. Aravind:Edible fresh water molluscs in North East India. *Tentacle* No. 28-March.
- Baby, R.L., HasanI, Kabir, K.A. and Naser, M.N. 2010. Nutrient analysis of some commercially important mollusks of Bangladesh. *Journal of Scientific Research*. 2 (2) : 390-396.
- Banerjee, S.R. and Satish, M.S. 1988. Mussel shell products Industry in Bihar. *Science Reporter*. 286-287.
- Boss, K.J. 1973. Critical estimate of the number of recent Mollusca. *Occas Pap. Molluscs*. 3 : 81-135.
- Bouchet, P. 1991. Extinction and preservation of species in tropical world. What future for Molluscs? *American Malacologists*. 20 : 20-24.
- Budha, P.B., Aravind, N.A. and Daniel, B.A. 2010. The status and distribution of freshwater molluscs of the eastern Himalaya. In: *The Status and Distribution of Freshwater Biodiversity of the Eastern Himalaya* (Allen, D.J., Molur, S. and Daniel, B.A., compilers), p. 42- 53. IUCN, Cambridge, UK and Gland, Switzerland; Zoo Outreach Organisation, Coimbatore, India.
- Chandra, K. 2017. Current Status of Freshwater Faunal Diversity in India, (Published by the Director, *Zool. Surv. India*, Kolkata). 1-624..
- Garcia-Cubas, A. 1963. Sistemática y distribución de los micromoluscos recientes de la Laguna de Terminos, Campeche, Maxico. *Boletín de La Instituto de Geología, Universidad Nacional Autonomo de Maxico*. 67:1-55.
- Ghosh, S., Jung, C. and Meyer-Rochow, B.V. 2017. Snail as minilivestock: nutritional potential of farmed *Pomacea canaliculata* (Ampullariidae). *Agriculture and Natural Resources* 51: 504-511.
- Hammer, Ø., Harper, D.A.T. and Ryan, P.D. 2001. Past: Paleontological Statistics Software Package for education and data analysis. *Palaeontol. Electron*. 4 : 1-9.
- Hornell, J. 1917. The edible molluscs of the Madras Presidency. *Madras Fisheries Department Bulletin*. 11: 1-51.
- Ramakrishna and Dey, A. 2007. *Handbook on Indian Freshwater Molluscs*. Kolkata, Zoological Survey of India. xxiii + 399.
- Rao Subba, N.V. and Dey, A. 1989. Freshwater Molluscs of India. *Zoological Survey of India*. Calcutta. 225-232.
- Rao Subba, N.V. 1989. *Handbook of Freshwater Molluscs of India*. Zoological Survey of India, Calcutta. 289..
- Seddon, B.M. 2000. Molluscan diversity and impact of large dams. Prepared for thematic review II.1: Dams, ecosystem functions and environmental restoration. IUCN Report.
- Van Bruggen, A.C. 1995. Biodiversity of Mollusca: Time for a new approach. Pages 1-19 in van Bruggen AC, Wells SM, Kemperman TCM, eds. Biodiversity and Conservation of the Mollusca. *Oegstgeest-Leiden (The Netherlands): Backhuys*.